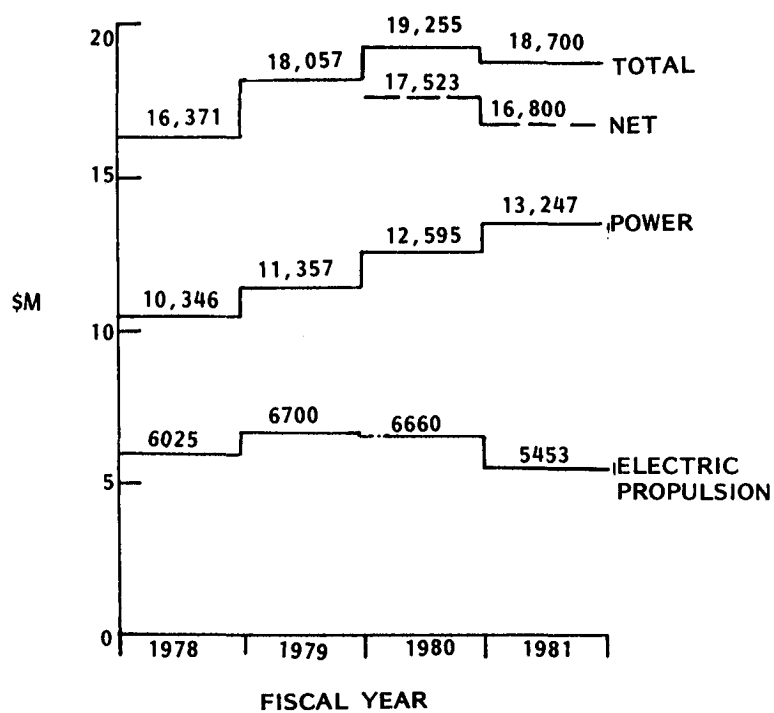


NASA TECHNOLOGY PROGRAM

OVERVIEW

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SPACE POWER AND ELECTRIC PROPULSION TOTAL R & D (\$K)



PHOTOVOLTAIC ENERGY CONVERSION (3.2M/58 DPY)

<u>THRUST</u>	<u>APPROACH</u>
o CELL R&T	{ - 18% SI CELL - 50 μ M SI CELL - CVD GAAS/CONCENTRATOR CELL - MULTIBANDGAP
→ 2 kW/KG	
→ LIFE (15%, 10 YR GEO)	
→ \$5/W	
o LOW COST BLANKETS/ARRAYS	{ - RADIATION IMMUNITY/GAAs - ANNEALING/RAD. HANDBOOK
→ \$30/W AT 100 kW	
o HIGH PERFORMANCE BLANKETS/ARRAYS	{ - CBC/LARGE AREA SI/PEP CELL - NON-VACUUM PROCESSES/DOE LINE
→ >300 W/KG GEO/PLANETARY	
	- CONCEPT TRADES
	- MODULE DEVELOPMENT
	- LOW COST SEP BLANKET
	- CONCENTRATOR CONCEPTS
	- PLANAR THIN CELL BLANKET

POWER MANAGEMENT AND DISTRIBUTION (3.4M/62 DPY)

<u>THRUST</u>	<u>APPROACH</u>
o COMPONENTS, CIRCUITS, SUBSYSTEMS	- POWER TRANSISTORS, DIODES, SWITCHES, CAPACITORS - CONVERTERS, CDVM, INVERTERS - APSM (PLANETARY) - AMPS (LEO) - AC/DC MODEL
→ >100 kW	
→ HIGH VOLTAGE	
→ LIFE	
o ENVIRONMENTAL INTERACTIONS	- CHARGING DESIGN G/L/NASCAP - HV PLASMA INTERACTIONS/DESIGN GL
o THERMAL MGMT	- CONCEPT TRADES - ACQUISITION/TRANSPORT/REJECTION COMPONENTS

CHEMICAL ENERGY CONVERSION AND STORAGE (2.7M/43 DPY)

<u>THRUST</u>	<u>APPROACH</u>
o HIGH ENERGY DENSITY → 1MJ/KG	LI PRIMARY LI SECONDARY WAS SECONDARY
o HIGH CAPACITY → 100 kW LEO 25 kW GEO	TORROIDAL NiCd FUEL CELL/ELECTROLYZER Ni H
o FUNDAMENTALS → LIFE UNDERSTANDING	NiCd RECONDITIONING NiCd FAILURE MODEL SEPARATORS

THERMAL TO ELECTRIC CONVERSION (1.7M/12 DPY)

<u>THRUST</u>	<u>APPROACH</u>
o POWER FOR NEP → 20 KG/KW	- JOINT PLANNING WITH DOE/AF - REQUIREMENTS ANALYSIS/SYST DESIGN - CONVERTER TRADES TE/TI EXPERIMENTAL BRAYTON ANALYTICAL - HEAT PIPE/RADIATION COUPLING - GDS PLANNING
o RTG CONVERSION → >10 W/KG	- ADVANCED MATERIALS/CONVERTERS
o STG DEVICES	- PANEL DESIGNS/TESTS

ADVANCED ENERGETICS

(1.3 M/24 DPY)

THRUST

o ADVANCED CONCEPT ASSMT

- OVERALL SOLICITATION/ASSESSMENT/REVIEW/WORKSHOPS
- SELECTED 'SEED MONEY' SUPPORT E.G.,
 - INERTIAL ENERGY STORAGE
 - PLASMA HEAT PIPE
 - SODIUM TE CONVERTER
 - LASER ANNEALING/WELDING
 - SPECTRA/THERMO PHOTOVOLTAICS*
 - LIQUID DROP/PARTICLE RADIATORS
 - FLYWHEEL STORAGE

o LASER POWER GENERATION & TRANSMISSION

- SOLAR PUMPING
- NUCLEAR PUMPING
- RECEIVERS

* CURRENTLY SUPPORTED IN
PHOTOVOLTAIC OBJECTIVE

SYNCHRONOUS ENERGY TECHNOLOGY (SET)

NEED:

MANY USAF & NASA MISSIONS WILL REQUIRE HIGH POWER
IN HIGH ORBITS

USAF: SPACE BASED RADAR, SPACE SURVEILLANCE,
SPACE WEAPONS

NASA: COMSATS, DIRECT BROADCAST, ELECTRONIC
MAIL

OBJECTIVE:

TO ASSURE TECHNOLOGY READINESS OF SYNCHRONOUS ORBIT
POWER SYSTEMS OF > 25KW BY 1985

BENEFITS:

ENABLING WITHOUT A NEW STS
AUTOMATED TO REDUCE COSTS AND VULNERABILITY AND TO
INCREASE RELIABILITY
MULTIPURPOSE MODULE CONCEPT

APPROACH:

DEVELOP DRAFT PROGRAM PLAN AT NASA/USAF WORKSHOP/MTG -
APRIL/MAY 1980

PLANNING

o NASA ADVISORY COUNCIL - SSTAC REPORT 1979

HIGH BENEFIT

- >100 W/KG SILICON ARRAY
- > 33 WH/KG NI-H
- 100-300V BUS/COMPONENTS
- >200 W/KG CONCENTRATORS
- > 50 WH/KG INERTIA WHEELS
- >50 WH/KG METHAL SULPHUR BATTERY
- >50 WH/KG H₂O₂ SYSTEMS

MODERATE BENEFIT

- AUTOMATED POWER SYST
- 300-1KV BUS/COMPONENTS

LOW BENEFIT

- ADVANCED NiCd

o NASA/AF SET TECHNOLOGY PLANNING

- FOCUS TECHNOLOGY TOWARD GEO, >25 kW, 10YR
- IDENTIFY NEW APPROACHES/CONCEPTS
- ESTABLISH GOALS/ROLES/RESOURCES